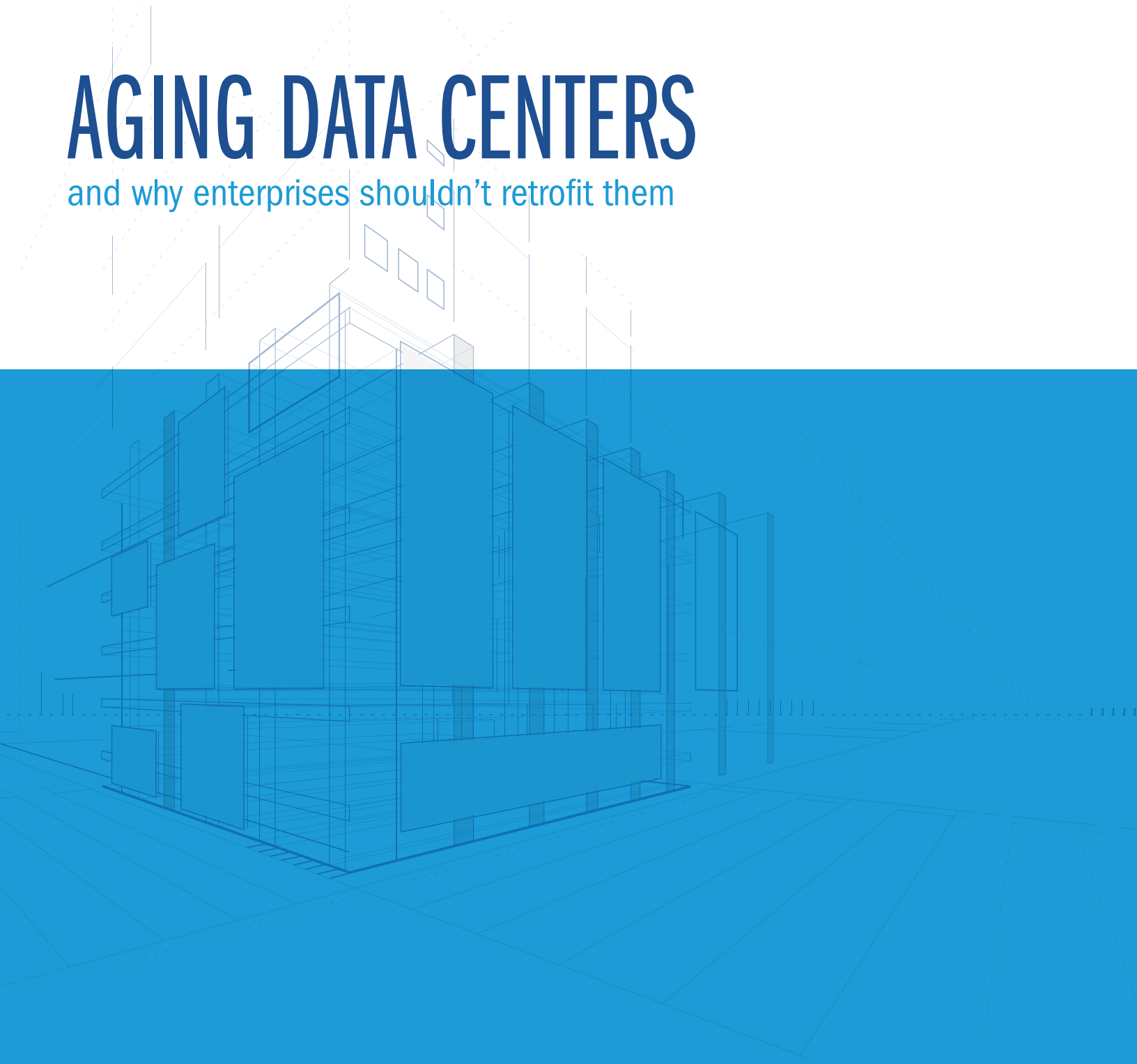
STACK INFRASTRUCTURE

AGING DATA CENTERS

and why enterprises shouldn't retrofit them



OVERVIEW

Deciding if your organization is holding onto its data center longer than it should?

Data creation, consumption, and the need to store and process it may have no foreseeable end, but a data center facility has a closing date. Data centers can last 20 to 30 years, but its economically productive lifespan often caps at 10-15 years[1]. Too often, enterprises attempt to squeeze as much life out of their data centers as possible despite drawbacks.

Housing mission-critical infrastructure, data centers need expensive maintenance, repairs, and replacements to ensure reliability of equipment and to keep pace with technology advancements. Retrofitting an existing data center to meet modern equipment needs is costly, not only in capital expenses, but also in terms of operational performance, energy efficiency, and overall customer satisfaction.

With today's ever-increasing demand for more data storage and connected processes, large enterprises must enable faster data processing and analytics for an improved customer experience or else inhibit their own growth. It is within an organization's best interests to invest in a new facility to enhance reliability, increase energy efficiency and sustainability, and improve capital financing, collectively preparing its design for the next age of technology. By 2025, Gartner predicts 80% of enterprises will have closed their traditional data centers[2].

80% of enterprises will have closed their traditional data centers by 2025.

In a 2021 study by 451 Research, IT decision-makers primarily based in North America reported that the greatest challenges to their enterprise's IT infrastructure encompassed infrastructure demand (23.3%), compliance obligations (22.4%), aging infrastructure (22.2%), lack of skilled staff (17.5%), sustainability goals (16.8%), and difficulty managing the infrastructure (11%)[3].

The study found that enterprises chose to rent space from a data center developer and operator to address IT challenges and other reasons, including to improve reliability (32.5%), to avoid managing own data center (23.3%), to better adhere to regulatory/compliance requirements (19.6%), to access renewable energy and/or improve efficiency (18.4%), to move from CapEx to OpEx (16.6%), and to circumvent their lack of skills in managing and/or operating a data center (9.2%), among others[3]. A modern build-to-suit leasing opportunity from STACK can resolve such IT challenges and support sustainability goals. STACK collaborates with each client to provide a custom data center with the capacity, density, and efficiency the enterprise needs and the control it wants.

This whitepaper outlines how the degradation of machinery over time impacts data center reliability, yesterday's technology cannot compete with today's efficiency, and switching from capital expenses to operating expenses gives way for capital efficiency. Private, aging enterprise data centers cannot compete with the custom control of a modern build-to-suit opportunity, prompting the widespread transition from owning to leasing data centers and supporting the industry consensus that the enterprise data center is dead.

RELIABILITY

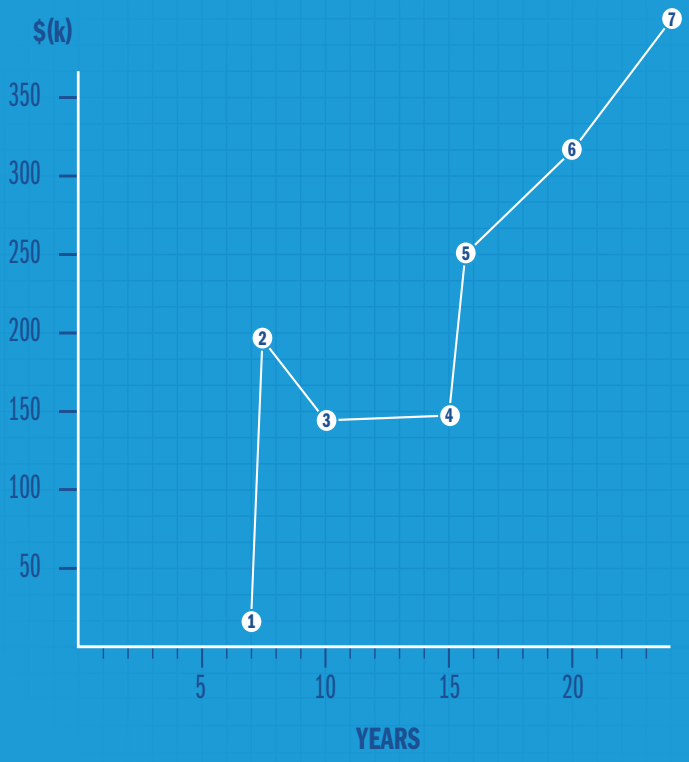
Is your enterprise about to hit a CapEx brick wall within your aging data center?

As a data center ages, its equipment degrades. Over time, failures of mechanical, electrical, and plumbing engineering systems increase in frequency and demand expensive maintenance and repairs. Eventually, large investments must be made to fully replace electrical and/or cooling systems to prevent downtime that becomes increasingly probable with each year.

In addition to the cost of new equipment is the cost to mitigate or plan downtime of IT systems during the upgrade. In a 2021 survey by ITIC, a single hour of downtime that takes mission-critical server hardware and applications offline, averages over $300,000 due to lost business, productivity disruptions, and remediation efforts to 91% of enterprises[4]. It is difficult enough for an enterprise to bear the cost of such downtime on its bottom line, let alone the impact on its brand reputation and customer experience.

Today, 89% of enterprises require a minimum of 99.99% availability, and 35% of those aim for 99.999% reliability[4]. Rather than build and operate their own data centers, these organizations are turning to build-to-suit opportunities that can provide brand new equipment, guaranteed uptime, and industry expertise. In fact, between 2020 and 2021, improved reliability and increased uptime helped drive over half of surveyed enterprises to migrate their applications and/or workloads from an owned data center to a leased one.

Figure 1 illustrates just a few capital expenses that increase with every item over the years. In the first five to seven years, capacitors and batteries will need to be replaced. Then, every 10-15 years, chillers need to be either rebuilt if water or replaced if air; and between 15 and 20 years, an enterprise will come up against a CapEx brick wall when the uninterruptible power supply (UPS) systems need to be replaced for hundreds of thousands of U.S. dollars—each. To top it all off, as the years pass and CapEx increases, so does the difficulty in acquiring talent with the skills to even repair and maintain such machinery, which often is no longer supported by the original equipment manufacturer (OEM) and spare parts may be unavailable.



Legend

1 Capacitor (each)
2 Batteries (all at once)
3 Water Chiller Rebuild (each)
4 200-ton Air Chiller Replacement (each)
5 Cooling Tower Replacement (each)
6 200-ton Water Chiller Replacement (each)
7 UPS Replacement (each)

EFFICIENCY

When does maintaining legacy systems become cost-prohibitive?

Every 18 months the speed of computer processing doubles in accordance with Moore's Law[5]. With the efficiency of technology advancing nearly every year, data center infrastructure equipment rapidly becomes outdated.

Fifteen years ago, data centers were not designed with efficiency in mind. Losses from electrical distribution systems, including UPSs, switchgear, transformers, and power distribution units (PDUs), can contribute 10-12% of a data center's average energy consumption[6].

For example, a legacy UPS operates at 85-92% efficiency, while a modern UPS system operates between 94-99% efficiency in the same load range[7]. A Schneider Electric report compares the costs of operating a modern 500kW UPS at 96% efficiency and a legacy 500kW UPS at 88% efficiency to support a 400kW IT load 24/7/365 at a rate of $.10 per kilowatt hour[7]. Figure 2 displays the cost savings of the modern UPS.

Figure 2

OpEx Savings of a Modern 500kW UPS at 96% Efficiency	
Annual Internal UPS Loss Cost	$28,032
Annual Cooling Cost for Losses	$11,213
Total 10-year Cost of Losses	$392,450

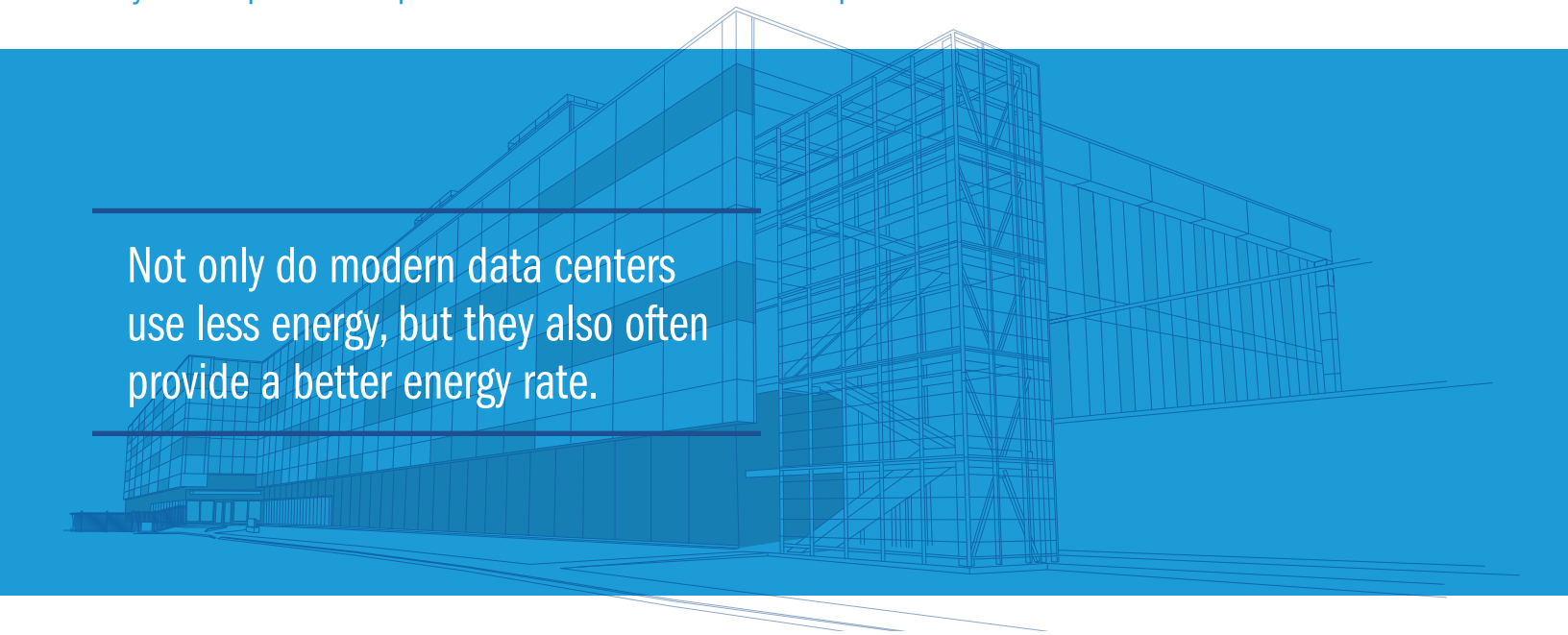
A modern UPS can make a dramatic difference in both operational performance and cost, but it is still only one element of a data center. The energy consumption of a facility adds up quickly, and every item of gear contributes to overall power usage effectiveness (PUE), which measures how efficiently a data center uses energy. Established by The Green Grid, a non-profit data center industry consortium, in 2007, the average PUE of 500 surveyed data centers in 2011 was 1.8[8], according to the Uptime Institute; and by 2021, the average progressed to 1.57[9].

In addition to PUE, The Green Grid implemented water usage effectiveness (WUE), a standard to measure the amount of water a data center uses to cool its IT assets. In 2016, the Department of Energy reported the average data center WUE in the U.S. was 1.8 liters[10]. Traditionally, legacy data centers rely on water chillers that utilize far more water than air chillers, which are more commonly found in recently built data centers. Legacy data centers cannot compare to the overall efficiency within the design, construction, and operations of today's data centers.

Both PUE and WUE directly impact corporate sustainability goals, which are critical concerns for decision-makers. When selecting a digital infrastructure provider, 52% of enterprises believe overall efficiency and sustainability of energy is very important[3]. Programs with local utility, national, state, provincial, and municipal governments may offer additional incentives for energy efficiency and sustainability initiatives, including corporate and property tax rate reductions and utility and government rebates, depending on the region's laws. Large enterprises can thus further capitalize on the cost-effectiveness of modern, energy-efficient, build-to-suit opportunities.

FINANCING

Why sink capital into a private data center when an enterprise can invest in its core business?



Not only do modern data centers use less energy, but they also often provide a better energy rate.

The Big Data industry forecasts its market will increase at a compound annual growth rate (CAGR) of 11% between 2021-2026[11]. Consequently, the global data management market is expected to expand at a CAGR of 13.8% to match the increased volume of data[12], and large enterprises must plan accordingly.

Over the next two years, 33.9% of enterprises expect their data center rack space to increase up to 24% and another 17.6% forecast an increase above 25%; driving factors of the expected rack space increase included new applications (40.3%), energy efficiency (32.9%), and a need for more power capacity (32%), among others[3]. To accommodate the need to govern, secure, and distribute more data at a faster rate, enterprises need to transition to newer, more energy efficient data centers that will ultimately improve capital efficiency.

In addition to improving power consumption and its costs as well as eliminating significant capital expenses for maintenance and repairs, modern data centers offer better operating costs. Over the past decade, the digital infrastructure industry has made considerable advances in controlling the cost of developing and operating data centers and driven down the cost per megawatt, while still maintaining robust and resilient capacity. Legacy data centers are sometimes powered by low voltage transmission, which result in a higher utility tariff cost per kilowatt hour than today's more popular high or medium voltage transmission deals.

Rather than sink capital into building a new data center on their own, large enterprises can invest in build-to-suit opportunities to address their need for more capacity while switching from capital expenses to operating expenses. Leasing allows enterprises to leverage the data center provider's balance sheet, while reducing their own risk and capital exposure. The cost savings of leasing versus buying allow organizations to invest in their core businesses. Enterprises can focus on research and development and delivering new products and services to keep pace with and even outstretch competitors, providing the largest return on investment for shareholders.

Enterprises can achieve the same levels of control, security, and compliance in a leased facility as they do in private facilities. Single-user buildings and build-to-suits provide the oversight of a private data center without the capital expenditure of one, allowing an enterprise to invest more in its core business.

CONCLUSION

Does retrofitting an old data center support the next 15 years of success?

The volume of data continues to increase, and organizations must modernize to keep pace and scale for future growth. Organizations are finding that the improved reliability, increased energy and water efficiency, and enhanced financing options of modern data centers is more cost-effective than retrofitting an outdated facility or sinking capital into building their own. As a result, the data center leasing market has a five-year CAGR of 11.3% through 2026, while hyperscale capacity leasing has a CAGR of 17.7%[13].

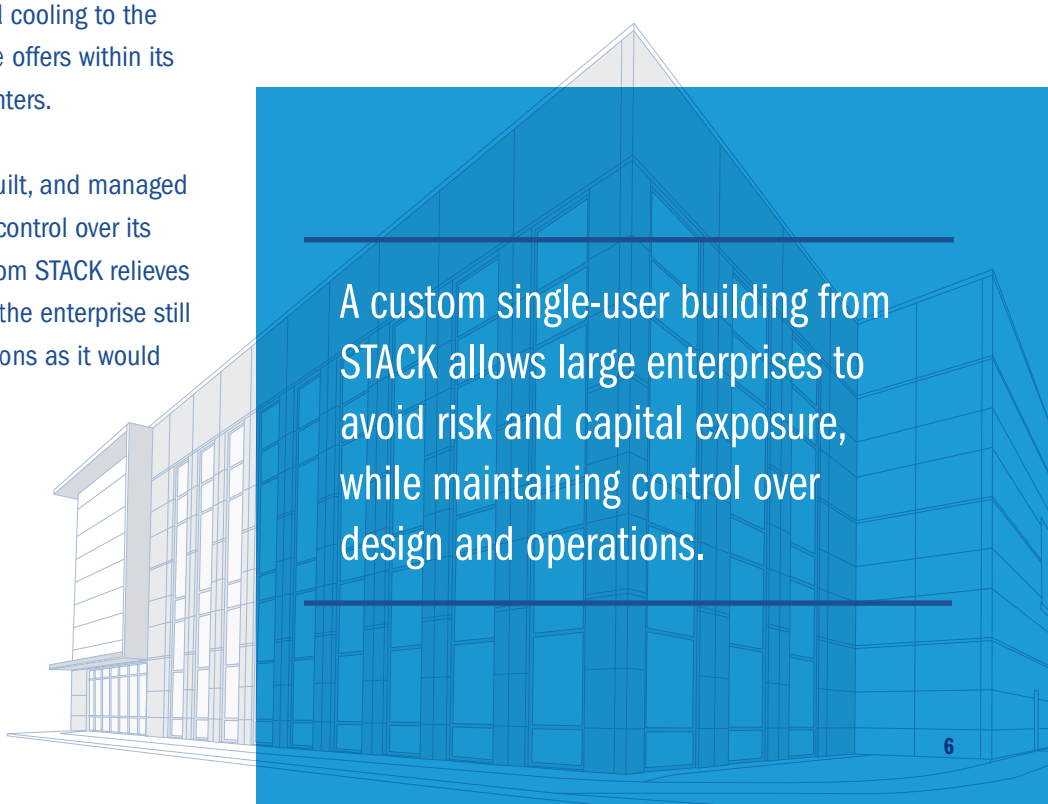
Large enterprises cannot rely on 10+ year-old data centers to guarantee uptime and an enhanced customer experience without exponentially increasing the CapEx costs over time. Legacy infrastructure cannot match the efficiency of equipment that emerges almost every two years. Leasing allows enterprises to invest in their core businesses and increase capital efficiency. More and more large enterprises are transitioning from owning private, legacy facilities to leasing modern, custom solutions. Within the next two years, over 26% of enterprises will increase their leased space up to 24%, and 16.1% will increase over 25%[3].

When selecting such a digital infrastructure provider, enterprises value Remote Hands services (27.2%), visibility into the facility's current PUE (17.3%), and availability of liquid cooling to the rack (16%)[3]—all of which STACK Infrastructure offers within its build-to-suit opportunities of custom data centers.

A large enterprise that previously designed, built, and managed its own private data center is accustomed to control over its facility. While a custom single-user building from STACK relieves the organization of risk and capital exposure, the enterprise still maintains control over the design and operations as it would with a private facility.

STACK works closely with a large enterprise to deliver a data center tailored to its specifications. STACK's industry-leading Development team acts as an extension of an organization's internal site selection and development teams, sourcing scale and creative solutions that fit desired capital structuring goals. The enterprise can select from STACK's efficient, low-water use Basis of Design (BoD), modify the BoD to its needs, or develop entirely custom solutions that meet its goals while ensuring 99.999% reliability and utilizing 100% renewable energy. The Solutions Engineering team collaborates with an enterprise's IT professionals to advise on and ultimately deploy selected mechanical, electrical and plumbing (MEP) solutions. STACK's award-winning Critical Operations team offers migration services and fit-out delivery to ensure a smooth transition into the new build and effective maintenance over the lifespan of the facility.

Whether an organization aims to improve reliability, increase efficiency, achieve sustainability goals, adhere to compliance regulations, or cut costs, a custom data center from STACK, purpose-built to the client's needs and specifications, provides the control, security, and optionality that enterprises need to scale for future success.



A custom single-user building from STACK allows large enterprises to avoid risk and capital exposure, while maintaining control over design and operations.

CITED SOURCES

1. Bonlender, B. (2018, January). State of the Data Center Industry. Retrieved March 16, 2022
2. Moore, S. (2019, August 5). The data center is (almost) dead. Gartner. Retrieved March 16, 2022
3. Thompson, D. (2021, August 5). Voice of the Enterprise: Datacenters 2021. 451 Research. Retrieved March 16, 2022
4. DiDio, L. (2021, September 30). The cost of enterprise downtime. TechChannel. Retrieved March 16, 2022
5. Big idea: Technology grows exponentially. Big Think. (2011, March 21). Retrieved March 16, 2022
6. Reduce energy losses from uninterruptable power supply (UPS) systems. Energy Star. (n.d.). Retrieved March 16, 2022
7. Gray, J., & Donovan, P. (2018, December). Guidance on what to do with an older ups. Schneider Electric. Retrieved March 16, 2022
8. Miller, R. (2011, May 10). Uptime Institute: The average pue is 1.8. Data Center Knowledge. Retrieved March 16, 2022
9. Uptime Institute 11th annual Global Data Center Survey shows sustainability, outage and efficiency challenges amid capacity growth. Uptime Institute. (2021, September 14). Retrieved March 16, 2022
10. Shehabi, A., Smith, S., Sartor, D., Brown, R., Herrlin, M., Koomey, J., Masanet, E., Horner, N., Azevedo, I., & Lintner, W/. United States Data Center Energy Usage Report. United States.
11. ReportLinker. (2022, February 15). The Big Data market size is projected to grow from USD 162.6 billion in 2021 to 273.4 USD billion in 2026, at a compound annual growth rate (CAGR) of 11.0%. GlobeNewswire News Room. Retrieved March 16, 2022
12. Enterprise Data Management Market Size Report, 2021-2028. (2021, July). Retrieved March 16, 2022
13. 2022: Global Data Centre Colocation & Interconnection Report. Structure Research. (2022, February). Retrieved March 16, 2022